

REMARKS

Applicants have amended claims 9 and 13 so as to recite features of the claimed invention that were inherent in the original claim language. No new matter has been added and no new issue has been raised.

Claims 9-12 have been rejected under 35 USC 102(b) as anticipated by U.S. Patent No. 5,811,871 (Nakashima). Applicants respectfully traverse this rejection.

In the pending Action, the Examiner repeats the exact same argument as in the Action dated October 2, 2003, relying on Nakashima's FIGS. 1-4 and 30-43. In the previous Action, the Examiner alleged that Nakashima's external base layer 30 corresponds to the claimed base region. In response to applicant's argument in the amendment filed December 29, 2003, that the claimed base region is formed prior to the formation of the base electrode layer and the insulating film covering the base electrode layer, the Examiner now contends that Nakashima's P⁺ layer 42 corresponds to the claimed base region. Applicants respectfully disagree.

Claim 9 as amended recites doping impurities of a first conducting type into a surface of a collector layer of a second conducting type and thermally diffusing the impurities of the first conducting type to form a base region of the first conducting type in the surface of the collector layer. Because the impurities of the first conducting type are doped and diffused into the collector layer, a complete base region is formed prior to the formation of other device elements such as the base electrode layer and the insulating layer.

The Examiner states at page 4, lines 2-4 of the Action, "Although the base region may not have been completed, region 42 represents the doped surface of the base region as required by the language of claim 9." Persons of ordinary skill in this art would have understood that forming a base region in a collector layer would require doping the impurities and thermally

diffusing the impurities. Doping alone, not followed by thermal diffusion, would result in incomplete formation of the base region, as the Examiner correctly points out. In fact, Nakashima teaches that the doped impurities in the P⁻ layer 42 are thermally diffused after the base electrode layer and the insulating film are formed. See, for example, column 6, lines 34-52 and FIGS. 2-4, of Nakashima. Nakashima does not teach or suggest the claimed base region formation because the claim language now expressly requires the doping and the thermal diffusion of the impurities that were implicit in the original claim language.

In addition, claim 9 recites forming a trench by etching the base region. Accordingly, the γ -shape recited in claim 10 must be the shape of the trench formed by etching the base region. The Examiner contends that Nakashima's CVD oxide film 35 formed inside the trench 32 shows a γ -shape. However, Nakashima's trench 32 that is formed by etching the P⁻ layer 42 is straight, as shown in FIG. 40 of Nakashima. What applicants claim is the shape of the trench formed by etching the base region and not the shape of the oxide layer filling the trench. Accordingly, Nakashima does not teach or suggest the γ -shape of the trench recited in claim 10.

The rejection of claims 9-12 under 35 USC 102(b) on Nakashima should be withdrawn.

Claims 13 and 14 have been rejected under 35 USC 102(b) as anticipated by U.S. Patent No. 5,789,285 (Yoshihara). Applicants respectfully traverse this rejection.

The Examiner again repeats the exact same argument as in the previous Action, relying on Yoshihara's FIGS. 2 and 3A-3K. In response to applicants' argument that one doping step is enough to dope both the trench and the base electrode, the Examiner contends that "the fact that the electrode may be doped twice is of no matter as applicant claims that the base electrode is doped with impurities of a second conductive type." Applicants respectfully disagree.

Claim 13 as amended recites doping impurities of the second conducting type into the trench and the base electrode layer. Because the impurities of the second conducting type are doped into the trench and the base electrode layer at this process step, only one doping is required to provide the impurities to both the trench and the base electrode layer. On the other hand, Yoshihara does not disclose the claimed step of doping both the trench and the base electrode layer at the same time. All Yoshihara teaches is doping Yoshihara's base layer electrode 43 at one process step (column 4, lines 45-48) and doping the trench 55 at a different process step (column 4, line 67 - column 5, line 3). No part of Yoshihara teaches that the base electrode layer 43 and the trench 55 are doped at one process step, as claimed. Accordingly, the claimed method of manufacturing the semiconductor device requires one less process step than that of Yoshihara.

The Examiner also contends that Yoshihara's SiO₂ layer shows the γ -shape recited in claim 14. Because claim 13, from which claim 14 depends, recites forming a trench by etching the collector layer, the claimed shape must be the trench shape formed by etching the collector layer. On the other hand, Yoshihara's trench that is formed by etching the collector layer 63 is straight and not γ -shaped. Accordingly, Yoshihara does not teach or suggest the claimed γ -shape of the trench.

The Examiner has not rejected claims 15-17 that were added in the previous amendment in the Detailed Action section even though the Office Action Summary lists claims 15-17 as rejected. Accordingly, applicants have no opportunity to respond to the rejection of claims 15-17 in this amendment, which should be taken as allowable on the face of the record.

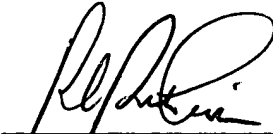
In light of the above, a Notice of Allowance is solicited.

In the event that the transmittal letter is separated from this document and the Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952**, referencing Docket No. 492322002600.

Respectfully submitted,

Dated: June 17, 2004

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